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MATTHIAS

OPTIMUM RECREATION CARRYING CAPACITY

for

WOODS CANYON COMPOSITE



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FOR
WOODS CANYON COMPOSITE

CHEVELON RANGER DISTRICT

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ABSTRACT

Recreation use in the Woods Canyon Lake area has far exceeded the capacity of the developed facilities. Unregulated use is causing soil and vegetative damage, safety and sanitation problems, and is lowering user satisfaction. This study was made to estimate the optimum carrying capacity for the composite and to make recommendations for design of facilities and/or management of the area.

Management objectives were first developed based on the existing situation, recreation resources of the area, institutional constraints, and user preferences. It was determined that management should be oriented toward the "Rural" portion of the recreation opportunity spectrum, and that the capacity of Woods Canyon Lake need not be a limiting factor to the capacity of the composite.

Although soils are highly erosive, the potential for camping developments is practically unlimited because of the flat terrain. Therefore, the capacity of the composite is dependent on the non-camping activities available to the campers. Relying heavily on a Bureau of Outdoor Recreation Study that developed capacity ranges for a variety of activities, an optimum visitor-hour-per-day capacity was developed for the existing and potential developed site activities. Then, utilizing a 1972 study by the University of Arizona for the Mogollon Rim, the number of hours per day that campers would spend at these activities was estimated. From there it was simple mathematics to estimate the optimum capacity for developed camping facilities, which turns out to be very near the current use.

Finally, recommendations are made as to the type, location, and development level of new facilities, and management techniques that could be used.

Literature Review

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INTRODUCTION

The Mogollon Rim is an abrupt escarpment resulting from an ancient uplift that created the Colorado Plateau. It extends across central Arizona for 200 miles in a general northwest-southeast direction. The terrain falls off rapidly south from the rim, while to the north it slopes off gradually.

The ponderosa pine and mixed conifer forest on the north sloping plateau have attracted recreation visitors for years. Cool summer temperatures, spectacular views from the Mogollon Rim, and a few clear mountain streams beckoned to desert visitors.

Then the Arizona Game and Fish Department conceived the idea of a series of lakes on the Rim. Eventually, a total of six lakes were built, in cooperation with the Forest Service. Coinciding with a period of nationwide increase in recreation activity, construction of the lakes helped to bring about a recreation mini-boom along the Mogollon Rim.

The first lake was built in 1956 on Woods Canyon. The Woods Canyon Lake Recreation Composite that has resulted is the subject of this report. The problem in this composite is one of extremely heavy use causing resource damage, creating problems of public safety, and lowering user satisfaction.

PURPOSE

The purpose of this study is to (1) develop an optimum carrying capacity for the Woods Canyon Lake composite and (2) suggest tools for management and/or design of future developments. Numerous researches have emphasized the need to establish objectives in order to arrive at a carrying capacity (Lime, 1975; Wagar, 1964; Driver, 1975; Knopf, 1980) therefore, arriving at a set of objectives has become a major segment of this report.

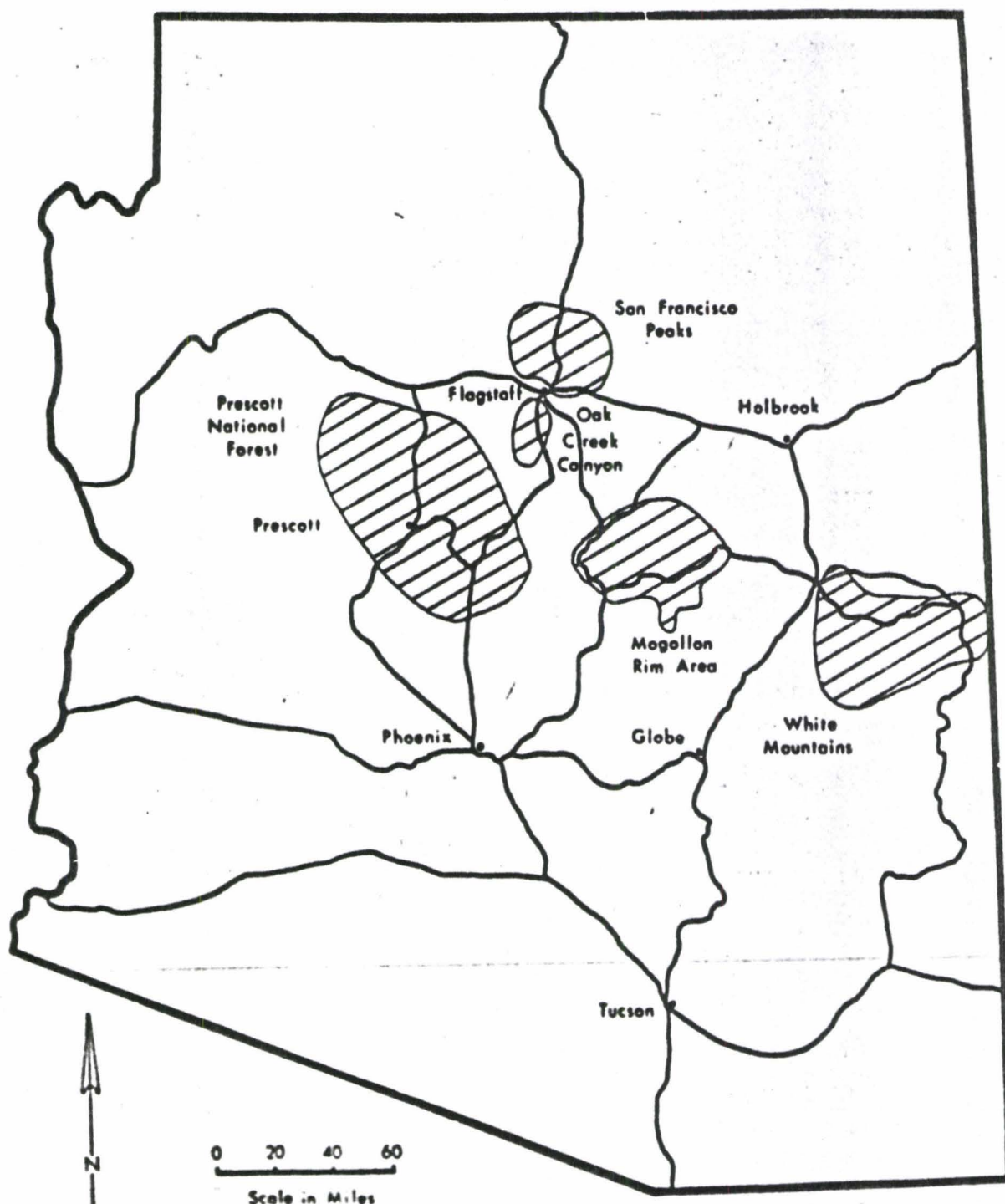
DEMAND

A detailed analysis of demand was not done as part of this study. However, there is reason to expect that demand will increase.

For one thing, current demographic studies indicate that the southwest in general, and the Phoenix metro area in particular will continue to grow in population. Since the Phoenix area is the primary source of the recreation users in the study area, it follows that demand will continue its upward trend.

Secondly, demand will probably increase as the price of gas climbs even higher. There appeared to be evidence of this trend on the Mogollon Rim last year, although the evidence cannot be termed conclusive yet. Brokaw and Cole (1977) determined that the average distance a destination oriented camper will travel is at least 150 miles, with 200 miles not being unreasonable. They also pointed out that gasoline prices had not yet influenced recreationists willingness to travel. Gasoline prices have roughly doubled since that time, however, and reduced attendance last year at major attractions such as Grand Canyon indicate that gasoline prices are beginning to take effect. Other preliminary studies also show the distance traveled on trips is down (Moncrief, Lecture, Clemson University, 1980)

Figure 1. DEMAND SOURCE POPULATIONS AND SUPPLY OPPORTUNITY AREAS



and the 1978 Arizona SCORP plan noted that "...a significant proportion of the population reports curtailment of recreation related travel due to rising gasoline costs".

In a 1972 study conducted by the University of Arizona (Recreational Visitors to the Mogollon Rim) it was found that of the 5 major National Forest Recreation areas in Arizona, the Mogollon Rim was the most preferred and the White Mountain area was a close second. It is interesting to note that the Mogollon Rim was also a big leader as second choice. Due to some similarities between the Mogollon Rim area and the White Mountains, the University of Arizona report concluded that probably "the majority of those who ranked the White Mountains number one, ranked the Mogollon Rim area second."

At about 120 miles from Phoenix, the Woods Canyon Lake area is well within the reasonable travel distance identified by Brokaw and Cole, while the White Mountains are at the 200 mile outer limit. Therefore, it is possible that we could begin to see a shift from the White Mountains to the rim area. Further evidence supporting this probability is that 28.6% of those listing the Mogollon Rim as their favorite area said that the most important reason was "proximity", while only 9% of those who chose the White Mountains gave proximity as a reason.

A paper by Thomas Moore and Gregory Bukyoff may shed additional light on this phenomenon. They state that a person's motivation to travel to a recreation site is largely a function of the attractiveness of the site and the psychological distance to the site. According to this theory then, the increased gas prices may be shortening the psychological distance to the rim in relation to other areas.

The question that remains is, at what point would gas prices make even the psychological distance to the Mogollon Rim too far, and secondly, will gas prices reach that point. With the information at hand, the manager can only assume that the demand at Woods Canyon Lake will continue to rise.

MANAGEMENT OBJECTIVES FOR THE COMPOSITE

Human behavior has been given considerable attention by recreation researchers during the last decade. Users attitudes and preferences must be considered in recreation management (Lime 1975). Driver wrote in 1975, however, that it is important to realize that behavioral information is only one of 5 elements that need to be considered, the other 4 being the resource, historical use, economics constraints, and political administrative constraints. A year later Brown, Driver, and Stankey wrote a paper in which they listed user preferences, institutional constraints, the resource, and the existing situation as the 4 factors that need to be considered for decision making. It is these last 4 categories that will be analyzed in this study.

I. PRESENT SITUATION

History

As stated previously, Woods Canyon Lake was built in 1956 by the Arizona Game and Fish Department. It's size is only 52 surface acres. The first

Forest Service recreation development followed in 1958 (through operation outdoors) with construction of Spillway Campground and a boat ramp. The private concession was also started at that time. Aspen Campground and Rocky Point Picnic Ground were added in 1963 and 1964.

In September 1959, the Forest Supervisor reported the summer use at about 1500 people per week.

Use statistics were reviewed back to 1969 (displayed in the appendix). A steadily increasing trend is readily apparent in all of the major activities.

Use of the Woods Canyon Lake area developed sites was reported at 55% of theoretical capacity in the management plan prepared for the area in 1967. Problems of crowding at that time are apparent from the statement "Present administration of the area attempt to regulate the total numbers permitted in the area, and area supervision is aimed at dispersing visitors throughout the various sites to increase user enjoyment and preserve recreational values".

Correspondence from the Arizona Game and Fish Department in 1965 indicates that they believed the proposed Canyon Point Campground would take care of the overflow from Woods Canyon Lake. This 78 unit campground was built in 1965 and was soon after at full capacity on weekends, and is now full 3 out of 5 weekdays as well.

Correspondence indicates that serious concerns about over-use began to surface in the early 1970's. Serious damage was occurring to the soils and vegetation, and sanitation problems began developing. In 1976, Dick Spray, from the Regional Office, made a service trip on Labor Day weekend at the request of the Forest Supervisor. His letter documenting the review reported extremely heavy use outside of the developed sites and continued resource damage. He also stated that "...many of the campers

who presently crowd around the entrance to Woods Canyon Lake are probably not looking for a dispersed recreation experience."

Safety

Another problem that is becoming more and more apparent is public safety. There are 3 primary areas of concern.

One has to do with traffic. The heavy recreation use in itself creates a traffic hazard at times. In addition the Rim Road is also used as a main log haul road. The rim road on the west end of the composite is only a single lane road, not nearly adequate for log hauling traffic and recreation traffic to mix. Log hauling is not permitted on weekends which eliminates that aspect of the problem during the heaviest use, but there is still a potential problem on weekdays. Dust and noise are also factors that affect visitor enjoyment. Upgrading this road will probably be possible with timber sales scheduled for the Rim Area in the near future.

Another safety problem has to do with the rim itself. In many areas, the rim is a vertical bluff at the top ranging from 40 to 80 feet high.

Campers regularly crowd into areas between the road and the bluff that are only a 100 foot or less wide. Several people fall off of the bluff each year with various injuries, and last year (1980) the first fatality occurred when a young boy fell 50 feet.

A third potential hazard is the large amount old logging slash near the concentrated use area. The slash increases the difficulty of fire control while the haphazard nature of the use would make evacuation very difficult.

2. RECREATION RESOURCE

The recreation resource of this composite, or any other composite, consists of 2 factors, (1) the physical characteristics of the land and (2) the man-made developments designed to protect or enhance the recreation potential. Either one of these factors can be an attribute that attracts the recreation users.

In the case of the Mogollon Rim area, it appears that the physical attractiveness is the leading reason for visitors coming to that area (University of Arizona, 1977). A smaller, but significant group, gave facilities-management as their main reason.

Physical Characteristics

The physical characteristics were briefly discussed in the introduction. The cool summer temperatures (generally no higher than 85%) and the scenery are, of course, major factors. The vegetation is predominantly ponderosa pine. Although past logging has greatly reduced the number of mature trees, a liberal sprinkling of the "old yellows" still adds spice to the landscape. One large grove of oak trees between the rim road and the rim offers a pleasing contrast to the continuous pine stands. And, of course, Woods Canyon Lake adds variable but rare hues of blue to the otherwise deep green surroundings. On the negative side, areas of soil and vegetation depletion and roadsides crowded with campers detract from the physical appearance.

The soils in the Woods Canyon Composite are very shallow. Sandstone parent material is usually only 6"-12" below the surface. Surface rock is abundant over much of the area and the soils are very erosive. Because of these sensitive soils the Environmental Analysis Report for a campground proposed at Willow Springs Lake (1979) stated that development should not occur on slopes greater than 4%. The terrain in the Woods Canyon Composite

is quite gentle so that areas with 4% or less slope aren't difficult to find.

Investigation of the soil and vegetative damage taking place from the heavy uncontrolled use indicates that the major contributor to this damage is vehicles. Therefore, controlling vehicles would be a giant step toward protecting the recreation resource.

Developed Facilities

Woods Canyon Lake is centrally located among the other 5 rim lakes built by the Arizona Game and Fish Department. Willow Springs Lake is the closest at 6 miles, and Knoll Lake to the west and Black Canyon Lake to

the east are both about 20 miles distant. Canyon Point Campground, the only other developed campground in the immediate area, is only 9 miles distant.

Much of the recreation activity in the composite takes place at developed facilities. Following is a list of recreation developments in the Woods Canyon Lake composite. Developed overlooks are notable in their absence.

Woods Canyon Lake - 52 acres, 2.7 miles of shoreline (water level is stable, but is not a productive fishery)

Campgrounds - two, both fee areas (78 units)

Picnic Grounds - 1 (15 units)

Boat Ramp - 1 (1 vehicle at a time)

Concession - Store, gas pumps, boat dock, boat rentals

Nature Trail - 1, 1 mile long

Amphitheater - 100 seat capacity

Group Area - 1

Opportunity Spectrum

Lime (1975) wrote that recreation managers should manage for a range of recreation opportunities. Through the work of Driver, Brown, and others the concept of a recreation spectrum has been developed. Driver developed the following spectrum with six classifications:

Modern Urban	Concentrated	Rustic	Semi-Primitive Motorized	Semi-Primitive Non-motorized	Primitive
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Each spectrum classification has with it a group of activity opportunities, recreational settings, and experience opportunities. The Forest Service has adopted this concept with only minor changes. The following 3 pages from the Recreation Planning Handbook describe the activities, settings, and opportunities associated with each classification. As can be seen, it ranges from a very primitive solitary experience on one end of the continuum to a very social experience on the other end.

This concept can be carried further by estimating a practical carrying capacity for dispersed areas. An entire forest can be classified into one of the six spectrum classifications. Then, with the additional consideration of factors such as slope and attractiveness, coefficient can be assigned and a capacity calculated.

For example, let's say you have 1,000 acres of an area classified as roaded natural. Using the coefficients developed by the Regional Office, Southwestern Region, the estimated capacity is calculated as follows:

Coefficient for Roaded Natural (Coniferous Forest)	15.0
Slope adjustment (0-10% slope)	-
Use pattern adjustment (weekend vs. weekday)	.45 1/
Length of Season Adjustment	1.25 2/

1/ Adjustment factor for ratio of 4:1 weekend use to weekday use.

2/ Adjustment factor for a 125 day season vs. 100 which 15.0 applies to.

Adjusted Coefficient

8.4

Estimated Capacity = 2,000 acres X 8.4 = 8,400 RVD's

The estimated capacity of the 1900 acres in the composite currently classified as roaded natural is:

1900 acres x 8.4 RVD's/acre = 15,960 RVD's/year

The estimated use on the area adjacent to the Woods Canyon Lake developments (4500 acres) is about 3000 RVD's on one summer weekend.

From these figures, it is immediately apparent that there is a conflict. The actual use is much greater than what is desired for the Roaded Natural classification around Woods Canyon Lake. As a result of the heavy use, there is little opportunity for the experience of "isolation from sights and sounds of man" or for "interaction with the natural environment".

This situation leaves the recreation manager with 2 options. Either management controls will have to be initiated to make the level of use commensurate with the ROS classification, or the experience level should be raised to urban and managed accordingly.

A variety of ROS classifications are adjacent to the composite. The area north of Woods Canyon Lake is classified as Semi-Primitive Motorized, as is a smaller parcel on the west end of the composite. The remaining bordering areas above the rim are Roaded Natural.

The area below the rim on the Tonto National Forest is mostly classified as semi-primitive Motorized. The Highline Trail parallels the rim in this area, and since it is open to motorcycles, it was given the motorized classification. It is very seldom used by cycles, however, so the actual experience is in the Semi-Primitive Non-motorized category (personal conversation with Steve Sams, District Recreation Staff, Payson District Tonto N.F.).

The 114 mile Crook Trail crosses the length of the composite. This trail commemorates the first wagon road into the rim country built by General Crook to service his military outposts. The trail route was marked in 1978 with metal chevrons, and has since been designated a National Recreation Trail. The route follows remnants of the original trail as best could be determined, but in most places it has been used in years past as log haul roads or skid trails. In addition, it crisscrosses the Rim Road in many places and is seldom far away from this well traveled road. Although the trail is of great interest historically, the noise, dust and hazardous road crossings prevent the trail from making any significant contribution to the recreation use potential of this composite.

The Highline Trail on the Tonto N.F. has several spurs to the top of the rim on the Apache-Sitgreaves National Forests. At least 3 of these spurs hit the top of the rim within the Woods Canyon Composite. These trails aren't signed or advertised and therefore, are seldom used.

Woods Canyon Creek flows below the lake, joining the Willow Springs drainage several miles downstream. Although quite small, it has catchable size trout.

Other unique features in the composite area are a couple of small sink holes and the old stand previously mentioned.

An activity that has shown a steady rise since the early 70's is snowplay. The rim is well covered with snow most winters and offers excellent opportunities for snowmobiling, cross country skiing, and general snowplay. Parking is becoming a problem along Highway 260 as a result of the increasing use.

Implications of the Recreation Resource

1. There is a conflict between the RDS classifications and actual use that needs to be resolved.

2. There is potential for additional development for activities within the composite, such as camping areas, overlooks and trail heads.

3. There is potential for a spectrum of opportunities adjacent to the composite.

4. Sensitive soils are an important factor in design and capacity considerations. The most important item probably being traffic control.

5. Snowplay should be recognized in the management scheme.

3. INSTITUTIONAL CONSTRAINTS

Institutional factors to be considered are economics, politics and Forest Service policy.

Economics is, of course, a prime concern. Inflation is rapidly increasing the cost of doing business. Not only are dollars scarce for building new facilities, it is increasingly difficult to operate and maintain the facilities already in place.

Serious economic problems naturally become political problems. The current conservative mood of the country was reflected in the recent political elections. The new administration is already taking steps to reduce the Federal budget. It appears that this conservative political-economic climate may be with us for some time to come. Therefore, minimizing both construction and maintenance costs must be part of the planning effort for this composite.

Management of the Rim area can fast become a public issue. Plans for a Zane Grey Highway were formulated in the 1960's. This highway would have traversed the rim from lakeside west (through this composite) and finally down to Camp Valley in the Verde Valley. The highway was built from Camp Verde to the rim above Payson, but that is as far as it went. Public sentiment from the Phoenix area against a paved road along the rim prevented completion of the project.

Three years ago the Chevelon Ranger District attempted to prevent camping immediately adjacent to the rim road where excessive damage is occurring. They found that people objected to being "harassed" by forest officers

much more than they did to crowded conditions, particularly there were no alternative places to camp.

Local politics is not a serious problem in the area. The nearest community is Heber, some 25 miles farther east. The business community generally favors attracting visitors to the Rim Area but they might resist establishing major concession on the forest if it was competitive to their interests.

Some interest in concessions on the Apache-Sitgreaves National Forests was expressed this past season. One individual wanted to establish a concession at Willow Springs Lake, similar to the one already in place at Woods Canyon Lake. Another person wanted to provide portable shower facilities at an existing campground. No interest has been expressed in actually developing a campground or other facility, however.

Forest Service policy in a broad sense was established by the RPA program submitted in 1975. The program recommended "increasing the supply of outdoor recreation opportunities and services through Forest Service programs that emphasize dispersed recreation". Policy further states that manager should "direct Forest Service funded recreation development primarily toward those activities that are not potential profit-earning ventures for the private sector". In addition, they should "endeavor to attract and assist private enterpreters in the provision of needed recreation facilities and opportunities on National Forest System lands". 1/

Implications of Institutional Constraints

1. Objectives will have to be met with minimum costs (both construction and maintenance).
2. The possibilities for private sector involvement should be considered.
3. Additional development in the Woods Canyon Composite would be within policy guidelines, as would moving toward true dispersed use.
4. The users of the area probably would not accept a decision to close the undeveloped areas of the composite to camping without providing an alternative. Neither would it be well accepted by Heber merchants.

4. User Preferences

The behavioral approach views recreation as an experience rather than an activity or opportunity (Driver 1975). This approach is based on the hypothesis that recreationists are motivated by certain factors (variables) in their living environment to select recreation activities that they expect will provide a specific type of gratification from the experience.

Driver contends that recreation is a production process. His model for this process has 9 steps.

1/ "The Forest Service Roles in Outdoor Recreation" USDA Forest Service Program Aid 1205.

1. Motivation - A person is activated by an internal or external force to perceive a gap between his existing state and a preferred state.
2. Thought Action - The individual begins thinking about ways to close the gap. Social environment and past experiences play an important part.
3. Physical Action - Actively searches for and evaluates alternatives. Personal and environmental constraints are weighed, as are the expected consequences. This step is a decision point.
4. Constrained demand: point between the time decision is made and avert action as a result of the decision.
5. Anticipation and preparation (self explanatory).
6. On-site activity (self explanatory).
7. Recall (self explanatory). Although identified as 3 separate steps, Driver states that the last 3 are a single continuum. The entire continuum is constantly under environmental influences.)
8. Satisfaction: the feeling measured largely by pleasure or the awareness of a positive experience. In other words, how well are the expected consequences met.
9. Benefits: go beyond feelings, and includes additional gains such as increased competence, work productivity, mental or physical health, self-esteem, knowledge, or greater marital stability.

Driver admits that the process is much more complicated than the model is able to depict, and that some variables may not be measurable. But he thinks progress is being made toward that end. More specifically, he states that "...expectations can be measured reasonably accurately for any large group of users with similar characteristics (such as day users picnicking at a particular site during a particular time who are similar in age, income, size of home city, past picnicking experience, etc.).

To the manager, however, this information is not easy to come by. Limitations to this approach are recognized by researchers as well. "Research is not a panacea for management" (Lime, 1975). Another asked, "Can we adequately address the allocation and management of resources with the tools at hand?" (Smith, 1975) On the other hand, in reference to studies by Lucas, Hendee and Harris, Clark, and Peterson, Driver maintains that past studies have indicated that "managers' intuitions and users' opinions about the recreational values of the facilities frequently differ". Therefore, he contends that the behavioral approach is necessary.

The Woods Canyon Composite has the advantage of being within an area studied by the University of Arizona in 1972. In this study, 1/, interviews

1/ Recreational Visitors to the Mogollon Rim Area of Arizona, U of A, 1977.

were aimed at gathering data about (1) user tastes and preferences, (2) cost of participation and (3) user constraints. Although tastes and preferences were for activities rather than for expected consequences, some inferences can be made from the various types of information gathered.

Expected Consequences

In real estate, when an individual buys real property, he can't really possess that property since it is fixed in location. There may also be limitations as to what he can do with the property. For example, mineral rights, water rights, deed restrictions or easements limit what a person can do with his property. Therefore, what a person buys is not so much the property but a "bundle of rights" that go with the property.

Driver and Cooksey use a similar concept when discussing human behavior (Preferred Psychological Outcomes of Fishing, 1977). They point out that a person is probably not looking for a single outcome from a recreation activity, but has a "bundle of more highly preferred outcomes" that he is seeking. The same can be said for a large group of persons using a given area. The trick is to identify the more highly preferred outcomes (expected consequences).

Researchers have not even agreed on a set of expected consequences that recreationists might be seeking. Driver and Knopf used the following 10 categories in a study on personality influences:

Experience Nature	Achievement
Affiliation	Dominance
Family Togetherness	Temporary Escape
Exercise	Tension Relief
Exploration	A.S. Reg.

In a 1972 Michigan study, Knopf used the following categories:

Achievement	Exploration
Avoid Others Expectations	Family Togetherness
Being with Others	General Escape
Dominance Control	Mental Change
Exercise	Social Recognition
Experience Nature	Tension Release
Risk Taking	

A study on the Salt River (Arizona) used the following 6 categories:

Peace and Calm	Escape Crowds
Learn New Things	Exercise
Develop Skills	Solitude

In a Michigan Study on the effect of size of cities (1976) Knopf used the following:

- Escape physical stressors
- Seek Security in social environment
- Seek privacy
- Escape visually unpreferred physical environment

Variables that Influence Preferred Outcomes

Researchers have identified several variables that influence the preferred outcomes of recreationists. They include:

1. Personality Traits (Driver & Knopf, 1975)
2. Socio-economic Characteristics (Mueller & Gurin, 1962
Mandall & Marans, 1972)
3. Characteristics defined by Past Experience
(Bevins et. al., 1968; Burch & Wenger, 1967)
4. Home-work Environment (Grubb, 1975; White, 1975; Knopf, 1976)
5. Environmental dispositions (McKechnie, 1970)

Of these 5 variables, we have knowledge of socio-economic characteristics and home-work environment in relation to Woods Canyon users. In addition we have a variety of information about users activity preferences and the desired attributes of the study area. ^{1/} The problem then, is to use the available information to select the "bundle of more highly preferred outcomes" for which to manage. Since the information is incomplete, preferred outcomes will be necessarily be rather general in nature.

The Mogollon Rim study provided the following information about the 2 variables mentioned above.

Socio-economic Characteristics of Users

The following information is known about the Mogollon Rim users.

Income: Above average

Age: Average age of party leaders - 39

Average number of members more than 16 years old - 2.3

Average number of members less than 16 years old - 1.4 (60% of families had at least one child younger than 16)

Group size: Average party size - 5

Average family size - 3.6 (more than 80% were in family associations)

Previous Experience: 88% of party leaders had been to the Rim area at least once. 70% of party leaders had previous camping experience.

Destination: Only 13% had a destination other than the Rim area

^{1/} Most of this information comes from the U of A study in 1972. The assumption is made that there have not been significant changes in the type of users in the last 8 years. It is also assumed that Woods Canyon users are typical of the Mogollon Rim users.

Length of Stay: Average length of stay - 2.4 days. Only 13% stayed more than 3 days.

Education: Above average, 48% attended college at least one year.

Implications of socio-economic characteristics

Income - The above average income would probably affect the the type of equipment used. This is supported by the study which indicates a 2 to 1 ratio of campers and coaches to tents.

Age - Younger people tend to be more active (See Table in appendix). The high percentage of families with at least one young child might indicate a need for child oriented activities.

Group Characteristics - The high % of family oriented groups would imply that family togetherness could be an important expected consequence.

Previous Experience - The correlation between expected consequences and actual consequences is much closer for repeat users than for first time users (Driver, 1975). Since most of the users (88%) had visited the general area previously, it can be assumed that at least some of the users "more highly preferred outcomes" are being met. Therefore, although crowded areas might not be desirable, escaping crowds must not be one of the most highly preferred consequences.

Length of Stay - The longer a person stays at a site the more his motivation for being there declines, and there is a correspondence decline in the positive emotions resulting from the experience (More & Buhyoff, 1979). The average length of stay has probably increased from 2.4 days since 1972 but the vast majority of of visitors are still in the 2-3 day category. Therefore, declining motivation over time is not a major problem. This could mean that campers need to spend less time in off-site activities and/or that they might be more tolerant of large numbers of people.

Home-work Environment

The following information is known about the Mogollon Rim visitors home-work environment.

Geographic Origin - 81% from Phoenix Metro Area

Main Categories of Work - Professional 21%
Managers 15%
Craftsman 19%

Place of Residence - 86% from cities

Implications of Home-Work Environment

Place of Residence - Since most visitors are from a large city, stress related to the noise and congestion of large cities is probably a major factor in the individuals expected consequences. Knopf did a study on

Michigan campers in 1976 relating their expected consequences to the size of city they lived in. The 4 consequences he evaluated were "Escape Physical Stressors", "Seek Privacy", "Social Environment", and "Escape Visually Unpreferred Physical Environment". He found that all four of these consequences were rated highest in importance by those living in cities greater than 500,000 in population. Escaping physical stressors and escaping the visual environment were both rated as very important, seeking security was only slightly lower in importance, and seeking privacy was more moderate in importance. Actual use tends to bear out that privacy is not of primary importance at Woods Canyon.

Geographic Origin - One hundred degree plus days are quite common in Phoenix during the summer. Temperature is a strong factor motivating many visitors toward the rim area.

Main categories of Work - The high percentage of Professional-Manager professions may indicate that job-related stress is a significant motivational factor. The Michigan study by Knopf showed that persons with demanding jobs had a strong desire to "slow-down mentally".

Neighborhood Environment - The high average income would indicate that the majority of users come from middle-class neighborhoods. However, this doesn't necessarily mean there is a lack of stress in the neighborhood environment. Knopf, for example, found that there was a correlation between expected consequence of recreationists and the crime rate in their

neighborhood. Therefore, no conclusions can be drawn about the neighborhood environment.

Additional Information from the Mogollon Rim Study

A large body of additional information about Mogollon Rim recreationists is provided by the Mogollon Rim study. This information is summarized on the following pages.

Activity Preferences by Mogollon Rim Users

<u>Activity</u>	<u>% of users participating</u>
<u>1/</u> Camping	64%
<u>2/</u> Relaxing	73%
Driving & Sightseeing	40%
Fishing	38%
Walking	36%
Picnicking	24%
Other	49%
Hiking	18%
Nature Study	16%
Photography	10%
Gathering Forest Products	9%

1/ Camping was defined as a maintenance function, i.e., eating, sleeping, making camp, etc. and was not allowed to exceed 12 hours.

2/ Relaxing was time spent not doing other activities nor camping.

<u>1/</u>	Boating	8%
	Swimming	6%
	Off-road vehicle use	5%
	Games	2%
	Bicycling	1%
	Horseback Riding	1%
<u>1/</u>	Attending talks & programs	.3%

Attribute Preferences by Mogollon Rim Users

<u>Attribute</u>	<u>% of Users Favoring</u>
<u>2/</u> Physical Attractiveness	29%
Proximity	23%
<u>3/</u> Crowds - Remoteness	13%
Facilities - Management	11%
Familiarity	10%
Hunting-Fishing	8%
Water	5%
Roads	3%

Implication of User Activity and Attribute Preferences

Camping - Since 64% of those interviewed were campers, 36% must have been day users. The Mogollon Rim study made no distinction between these two types of users when compiling the preference information. A letter written by the District Rangers in 1977 during a fire closures (appendix) strongly supports the implication that day use is a significant factor.

Physical Attractiveness - The high rating given this attribute correlates well with the Michigan study by Knopf that rates the expected consequence of "Escape visually unpreferred Physical Environment" as very important. It should also be noted that one of the major attractions, the Mogollon Rim, has no developed overlooks or vista points in the composite.

Crowds Remoteness - This attribute was important to a relatively small percentage of participants. Since the sample was taken at developed sites or regularly used undeveloped areas, it is implicit that for most people escaping crowds is not one of their most highly preferred consequences. This also correlates with the Michigan study by Knopf which rated "Seeking Privacy" as the lowest of the 4 expected consequences (although not totally unimportant).

1/ Boating and attending talks and programs were available at only a few of the locations where interviews were conducted. Since both activities are available in the Woods Canyon Composite, it is logical to assume that the actual participation rate for the composite is much higher.

2/ Physical Attractiveness includes temperature.

3/ People in this category perceived the area to be uncrowded, but there is no indication of whether they were in developed sites or dispersed areas.

Facilities Management - Facilities must be desirable because almost as soon as a campsite becomes available in Aspen and Spillway Campgrounds, another party moves in. However, the low percentage of participants that rate facilities important would indicate that the facilities are not the primary attributes they seek. This might explain why, although recreation personnel frequently are asked if there are plans to build more campgrounds, they seldom get formal complaints from campers about lack of facilities.

Hunting/Fishing and Water - A surprising result of the study is the relatively low importance given to the water and fishing attributes of the area. This is especially true in view of the fact that Woods Canyon Lake seemed to be the catalyst that started the recreation boom in the vicinity, and also that 38% of the people using the Rim area participate in fishing. Apparently, it is the physical attractiveness of the lake setting that is drawing people rather than the water and associated activities.

This has several implications. First of all, if people are fishing and boating primarily because it is available, then fishermen as a general rule are probably not highly skilled or success oriented. Therefore, they are probably more tolerant of other fishermen and the lake capacity would be at the high end of the capacity range. (The greater the skill in an activity, the less tolerance there is for other people, Clemson lecture, 1980.)

In view of the above, it appears that fishing and boating are socially oriented activities, which means other activities can be more readily substituted with equal satisfaction to the participant. Therefore, the carrying capacity of the lake need not be a limiting factor to the carrying capacity for the composite.

Driving and Sightseeing - This popular activity could become less desirable in the future as the price of gas rises. Those that do participate in this activity may not want to go far. Therefore, vistas and overlooks in the vicinity would be beneficial. Also, some good standard roads within or close to the composite area would be desirable, especially if they lead to a scenic feature, such as a meadow or aspen stands. Recreationist may look more and more for a substitute to this activity in the future.

Walking - This activity is defined as a leisurely stroll, whereas hiking is of a more strenuous nature. Walking may occur on trails but often occurs on roads. There is a real opportunity to improve the quality of experience from this activity in this composite by taking advantage of one of the main physical attractions, the Mogollon Rim. Building a rim trail that is readily accessible from overlooks and popular camping areas would be an excellent means of doing this. This type of walking opportunity might also provide a substitute for driving and sightseeing and perhaps even fishing.

Relaxing - The fact that this activity is the most popular activity of all, both in terms of the number of people participating and the amount of time participating, coincides with the previous conclusion that "escaping physical stressors" and "slowing down mentally" are important expected consequences.

Other Knowledge of Users

Potential Users -

In addition to the study done on the Mogollon Rim, the University of Arizona did another study in 1972 on demand source populations (Six Recreation Demand Source Populations). One of the populations they studied was, of course, Phoenix. The study was made with questionnaires sent out at random to residents so it provides an insight into potential users of the study areas. The following table is a comparison of what Phoenixians said and what they actually did in the Rim area.

Comparison of Potential Users to Actual Users

Characteristics	Phoenix Area Respondents	Mogollon Rim Participants
Income	above average	above average
60 years old or older	25%	10%
Average age of	Head of household - 48	party leader - 39
One or more children <16	58%	60%
Attended college at least 1 year	58%	48%
Main categories of work	professionals - 33% managers - 16% craftsman - 16%	professionals - 21% managers - 15% craftsman - 19%
Visiting rim area 2 or more years	60%	88%
Camping equipment owned	tents - 26% mobile - 27%	tents - 32% mobile - 60%
Own ORV's	19%	22%
Own backpacks (families)	29%	33%
Own fishing gear	66%	86%
Own boat	7%	23%

Implications of Knowledge of Potential Users

As can be seen there is a close correlation between the Phoenix area respondents and the Mogollon Rim users, except for one item. The percentage of people visiting the rim with mobile camping equipment is about twice as high as you would expect from the Phoenix sample. This could indicate that there is a large potential population of tent campers. As gas prices rise, initial observations by recreation managers in the rim area indicate that the number of tent campers is already going up.

It was stated earlier that recreationist who prefer the White Mountains may tend to use the Rim area due to higher gas prices. White Mountain visitors appear to be quite similar to Mogollon Rim area visitors as far as their reasons for their preference are concerned, with one exception. A significantly higher percentage of White Mountain visitors gave hunting-fishing and water primary importance. Since the White Mountains offer considerable more fishing opportunities this may indicate that the average White Mountain fisherman is more skill-achievement/exercise oriented. Therefore, if this type of individual switches to the Woods Canyon area where this opportunity is generally lacking, a different type of activity will be needed as a substitute. Hiking is one possibility.

General Information

The University of Arizona report synthesized the remarks and commentary of visitors that weren't directly associated with specific interview questions. They are summarized as follows:

Development - This factor elicited the largest number of responses, with those against about double the number as those for development. The "pro" element included a desire for tent units in developed sites that were free of curbing and pavement, plus expansion of commercial services and overflow sites. The "con" element represented a preference for undeveloped sites, but included by some was a desire for toilets and drinking water.

Roads - This factor was also divided into 2 elements, those favoring more roads and those who wanted no more roads. The "cons" outnumbered the "pros" by 3 1/2 to 1. Most everyone who commented favored good maintenance on existing roads.

Facilities - Comments on this factor were about equally divided between the need for (1) more and better facilities, (2) more drinking water, and (3) more refuse cans and cleaner restrooms.

Information - This factor also received large number of comments. Apparently, many people feel there is a lack of information about the area from the time they begin planning their trip right on through the time they participate. Many also felt that road and trail signing was inadequate, and that interpretive trails and programs were desirable.

Crowding - A significant number (68) of respondents voiced objections to crowding as a function of poor hunting, fishing, full campsites or traffic congestion.

Fishing - All comments on fishing stated a preference for improved fishing conditions. However, the number of comments was low.

Implications of the General Information

1. The division between the "pro" and "con" development groups isn't clear cut since some people in both groups favored minimal facilities. Confining development to a composite area would probably be favored by the majority.
2. A need for providing more information is evident. Locating an information station on the rim adjacent to highway 260 would not only serve the Woods Canyon Composite, but would also serve users heading for other areas on the forest.
3. Although the previous conclusion was that escaping crowds is not of primary importance, the number of comments indicates that the visitors' experience could be improved by reducing the appearance of crowding.

Management Objectives

The preceeding information can now be assimilated into a set of meaningful objectives for the composite. They are as follows:

1. Restore areas presently exhibiting serious soil and vegetation damage, and prevent unacceptable damage in the future. (Precise objectives that will provide a yardstick for monitoring should be developed in the Environmental Analysis.)
2. Provide for public safety in relation to vehicle traffic, the bluff along the rim, and wildfire potential.
3. Eliminate sanitation problems, which are unsightly as well as unsanitary.
4. Orient management in the composite toward the Rural portion of the ROS spectrum, with undeveloped areas being left in the roaded natural category.
5. Orient management toward the following "bundle of more highly preferred consequences".
 - a. Escaping physical stressors
 - b. Slowing down mentally
 - c. Family togetherness
 - d. Escaping poor visual environment
 - e. Social interaction
6. Emphasize protection or enhancement of the visual resource and provide for opportunities to observe the special features of this resource (as per 5-d above).
7. Woods Canyon Lake will be managed to maximize the fishing and boating opportunity rather than as a fishery for a large number or large size fish. The capacity of the composite will not be limited by the capacity of the lake. (Recognize that catching fish is till a plus to positive emotions so regular stocking should be encouraged.)
8. Hold development and maintenance costs to an absolute minimum.
9. Provide for day use as well as camping use.
10. Manage areas adjacent to the composite for a range of opportunities and settings.
11. Improve the quality the rapidly increasing winter recreation use.

DETERMINATION OF OPTIMUM CARRYING CAPACITY

Definition

There are about as many definitions of carrying capacity as there are researches who write about it. One definition for it is "the amount of use the land is capable of sustaining without degradation of the social, physical and biological parameters below the level set by management

objectives" (Mike Manfredo, lecture, Clemson University). This rather precise definition of carrying capacity implies the establishment of rather definite parameters. In the case of this study the parameters are not that precise.

Another definition from a Bureau of Outdoor Recreation study "Guidelines for Understanding and Determining Optimum Recreation Carrying Capacity" states that optimum carrying capacity is the amount of use of a recreation resource that is most appropriate for both the protection of the resource and the satisfaction of the participant. This definition coincides more closely with the level of the objectives developed in the previous section.

Process

Since it has been determined that management direction for the Woods Canyon Composite will be oriented toward the urban portion of the opportunity spectrum, additional developed camping facilities are indicated. There is ample room within the composite to develop almost unlimited camping facilities and still adequately protect the physical resource. The limiting factor is the capacity of non-camping activities that are necessary to meet the users expected consequences.

The first step in determining the capacity is to determine the capacity of the non-camping facilities (existing and potential). The BOR study mentioned above will be the primary source for determining the capacity estimates of the various activities.

A major feature of the BOR study is that it included interviews with participants in 54 parks across the nation. It also included interviews with 46 recreation administrators and planners. The parks included in the study ranged from those in urban/metropolitan areas, to those located in more remote area.

The results of the study were displayed in the form a continuum for each activity with a low and high capacity on opposite ends and a suggested base somewhere in between. The report then suggested a method of estimating capacity. The procedure is to identify factors that influence the capacity and rate them to determine which way and how far to move from the base for a particular activity.

Identifying the factors that influence capacity is critical, but it was felt that for the Woods Canyon area equal weight should not be given to all the factors. Therefore, the selection of capacity was done subjectively based on the factors identified rather than mathematically as suggested in the BOR report. The optimum capacity was found to be somewhere near the suggested base level for most activities.

Another element that enters into the carrying capacity is the amount of time spent at the various activities. For example, if 400 people visit an area and the average length of time a participant is involved is 2 hours, then the people-at-one-time capacity is 100 people ($400 \times 2/8 = 100$).

The 1977 U of A study on the Mogollon Rim also involved collecting data on the size of the party participating and amount of time people were

spending at the various activities. Although the average time per participant by activity wasn't calculated, an estimate can be made from the data in the report. The average times and party sizes are displayed below.

<u>Activity</u>	<u>Average Party Size</u>	<u>Average Time Per Party</u>
Camping	5.0	*
Relaxing	4.4	5.2
Other	4.7	3.9
Driving & Sightseeing	4.4	2.7
Fishing	3.2	3.7
Walking	3.7	1.3
Picnicking	5.3	1.6
Hiking	3.7	1.9
Boating	3.1	3.1
Nature Study	3.0	1.7
Photography	1.7	1.4
Gathering Forest Products	3.0	.6

* Data not available.

Estimating Capacity of Facilities

The first task is to identify existing and potential non-camping developments and other associated activities. Potential development will be limited to those identified previously as having excellent potential to improve the visitor's experience.

The existing developments and associated activities are:

- Woods Canyon Lake - fishing and boating
- Nature trail - walking, learning
- Picnic ground - picnicking
- Woods Canyon Creek 1/ - fishing
- Concession area - other
- Amphitheater - learning

Potential developments and associated activities are:

- Rim trail - walking and hiking
- Highline trail 2/ - hiking
- Overlooks - viewing scenery
- Information center - other
- Picnic area - picknicking, viewing scenery

1/ Although Woods Canyon Creek is outside of the composite, the main access point is within the composite, and most users originate from within the composite. It is considered as developed because it requires stocking.

2/ Although the Highline trail and spurs to the rim are existing, it is unavailable because there is no signing or trail head parking.

Capacity estimates will be made for one facility/activity at a time. The results will be aggregated into a daily visitor hour capacity for all available activities (excluding camping). An estimate will then be made as to what portion of these hours will be from day users and what portion will be from campers. Then the average amount of time/day campers spend at camping and other non-developed activities will be estimated. This number of hours subtracted from 24 will give the number of hours the average individual will need to spend at developed non-camping activities. And that answer divided into the total visitor hour capacity of these activities available to campers will yield an estimate of the number of people we should provide camping facilities for at the optimum capacity.

X = Optimum visitor hours available to campers per day from developed non-camping activities.

Y = Average number of visitor hours required per camper per day for developed non-camping activities.

Z = Optimum capacity for developed camping facilities

$$X = \frac{Y}{Z}$$

Woods Canyon Lake

Surface Capacity -

Woods Canyon Lake has 52 surface acres. The suggested optimum capacity range for boat fishing is 1 to 16 boats per acre, with a base of 2 boats per acre (167' between boats if evenly spaced). The suggested optimum capacity range for non-power flat water boating is .4 to 2 boats per acre, with the base at .2 boats/acre (240' between boats if evenly spaced). The BOR boating range includes all types of boating, from sailboating to canoeing. Since boating at Woods Canyon consists primarily of row boating and canoeing, the capacity would be at the high end of the range.

The suggested capacity would be nowhere near the 16 boat maximum that is probably only a capacity for a truly urban area. Given that the users are mostly oriented, the capacity would probably be above the base figure, but recognizing that fishing is poor much of the season, capacity probably wouldn't be much above the base, say 2.5-3 boats per acre.

When taking into account the boating use, a capacity of 2 boats per acre is probably a good compromise.

$$2 \text{ boats/acre} \times 52 \text{ acres} = 104 \text{ boats}$$

$$104 \text{ boats} \times 3.1 \text{ people/boat} = 322 \text{ people capacity}$$

17 Angellon and Study from University of Arizona.

Shore Capacity -

There are 2.7 miles of shoreline around the lake. The suggested optimum capacity range is 41 to 528 fishermen per mile, with the base being 147 fishermen per mile (36' between fishermen if evenly spaced).

For the same reasons listed for boat fishing, the optimum capacity is probably slightly above the base figure, say 180 fishermen per mile.

180 people/mile x 2.7 miles = 486 people capacity

Total Lake Capacity	486 people
	+322 people
	<hr/>
	808 people

Nature Trail

The nature trail at Rocky Point Picnicground is about 1 mile. The closest category to this kind of use in the BOR study is general hiking. The suggested optimum range is 3 to 21 groups per mile, with the base being 12 (440 feet between groups if evenly spaced). For this type of trail, as well as the user, the upper end of the range would be satisfactory, say 20 groups per mile. However, history has shown that it isn't realistic to expect this kind of use.

Trail Capacity = 1 mile x 20 groups/mile x 3 people/group = 60 people

Rocky Point Picnic Ground

The capacity is established by the design of the development.

15 family units x 5 people/unit = 75 people capacity

Woods Canyon Creek

This creek extends several miles below Woods Canyon Lake Dam. However, 4 miles is probably the maximum limit users from Woods Canyon would normally fish. This canyon is classified as semi-primitive, non-motorized in the opportunity spectrum. The BOR study has no figures for stream fishing, so in this case the Primitive Hiking category will be used as a substitute. The suggested optimum capacity range is 1 to 7 groups per mile.

The canyon does a lot of meandering so sight distance is short and sounds don't carry far, but the stream is small and fishermen normally cover a lot of ground. Therefore, capacity should be at the low end of the range, say 2 groups per mile.

Capacity = 4 miles x 2 groups/mile x 2 people/group = 16 people

Concession Area

The concession area consists of a small store, gas pumps and boat docks. Visitors at the facility may be purchasing a few necessities, but also probably have other motives such as to get a view of the lake, to get

information, or simply to meet other people 1/. There is no design capacity for this facility so it will be arbitrarily set at 40 people (includes dock area, etc.)

Amphitheater

The design capacity is 100 people at one time.

Potential Capacity from New Development

Overlooks -

The BOR study offers no capacity guidelines for vista points. The natural features may well be the limiting factor. Since all potential sites aren't specifically identified and investigated, this isn't possible to determine. However, it can be reasonably assumed that the 7.8 miles of rim on the composite border offer more than enough capability to handle the demand. So in this situation, an estimate will be made of the needs to meet current demand on a non-holiday weekend.

An estimated 3000 people are visiting the composite area at a given point in time on a non-holiday summer weekend. We know that the physical attributes of the area are the primary attraction to visitors, so the participation rate would be high. For the purposes of this estimate it will be assumed that 80% of the visitors would stop at developed overlooks on the average of twice per day (with more than one overlook). The authors experience with vista points indicates an average of 10 minutes per stop per party. Since this activity may partially substitute for driving-sightseeing as gas goes up in price, we'll assume the average length of visit will increase to 15 minutes.

Therefore, the estimated parking capacity needed is calculated as follows:

3000 weekend visitors ÷ 5 people/party = 600 parties

600 parties x 80% participation rate = 480 parties

480 parties x 2 visits/party = 960 visits (equivalent to 960 parties)

Assume one car per party

12 hour visitation period ÷ .25 hr./party = 48 parties/parking space

960 parties ÷ 48 parties/space = 20 parking spaces required

If one of the overlooks was adjacent to the highway the capacity needs would increase for that site. The average daily traffic on Highway 260 on a summer weekend is 6000 vehicles. 2/ If 20% of the vehicles stop at the overlook for an average of 10 minutes, the additional parking capacity needed would be:

1/ Study of a visitor center found that reasons people visited were (1) for the kids (2) to learn (3) to meet others (4) for orientation (Knopf, Clemson Lecture, 1980).

2/ Arizona Department of Transportation.

12 hours + 1/6 hour per party = 72 parties/space

6000 vehicles x 20% = 1200 parties

1200 parties + 72 parties/space = 17 spaces

Rim Trail

A rim trail would have potential use for both walking and hiking activities. Walking would primarily take place from overlooks and camp and picnic areas within easy reach of the trail. Hiking would extend farther from these access points and possibly even consist of loop hikes tying into the Highline Trail.

The suggested optimum carrying capacity range for hiking is 3 to 21 groups per mile, with a base of 12 groups per mile (440' between groups if evenly spaced). Walking would tend toward the upper end of the scale, particularly since the trail would parallel an attraction like the rim. Sixteen groups per mile will be used.

Hiking, on the other hand, would tend toward the lower half of the scale, though, the physical attraction of would push it upward. Eight groups per mile will be used.

Assuming 3.5 miles of a rim trail would be within 1/2 mile of an overlook or camp/picnic area, the walking capacity is calculated as:

16 groups/mile x 3.5 miles = 56 groups

56 groups/3.7 people per group = 207 people

If the remaining 4.3 miles of rim trail are considered as hiking trail, the capacity is:

4.3 miles x 8 groups/mile = 34 groups

34 group x 3.7 people/group = 126 people

Total capacity of Rim Trail	207
	+126
	<u>333</u>
	people

Assuming 70% of the use on this trail would be directly from camp and picnic grounds and 30% of the use from trail head parking, then the parking capacity needed is:

90 groups x .3 = 27 groups = 27 parking spaces

Highline Trail (and spurs)

The Highline Trail is in the semi-primitive motorized portion of the opportunity spectrum, although the experience is basically non-motorized.

Therefore, capacity should be oriented towards the low end of the scale. However, the spurs include some portions of the roaded-natural portion of the spectrum. Users would probably not expect an immediate drop to semi-primitive use as they leave the rim, and it is not logical to expect that it would happen. Therefore the spurs should have a higher capacity.

The suggested optimum capacity range for primitive hiking is 1 to 7 groups per mile, with a base of 3.5 (1500' between groups if evenly spaced). The trail spurs would be at the upper end of this range so 7 groups per mile will be used. Since management is directed toward the semi-primitive part of the spectrum rather than primitive the base of 3.5 is reasonable for the main trail. (The ROS criteria for semi-primitive non-motorized is 4-16 encounters). The capacity is calculated as follows:

2 miles of spur trails x 7 groups/mile = 14 groups
5 miles of main trail x 3.5 groups/mile = 18 groups
32 groups x 3.7 people/group = 118 people

Assuming that 75% of the use on this trail would originate from this composite and 90% of that use would be from trail head parking, other parking capacity needs are as follows:

32 groups x .75 = 24 groups
24 groups x .90 = 22 groups = 22 spaces

Picnic Area

The oak grove covers about 15 acres. Factors favoring a capacity toward the high range are its proximity to the Mogollon Rim, its linear configuration, and attractive vegetation. Negative aspects are the large size of the area and the sparse around cover. Another factor that would influence capacity is the degree of development.

The suggested optimum capacity range is 4 to 35 tables/acre, with a base of 13 (58' between tables). Even with full development (tables and grills, etc. the base of 13 tables (groups) per acre seems high for the large area involved. Ten/acre would be a more realistic figure. If development consisted only of parking and sanitary facilities, a figure of 7 groups/acre would be more appropriate.

The capacity is calculated as follows:

With full development--

15 acres x 10 groups/acre = 150 groups
150 groups x 5.3 people/group = 795 people

Without full development--

15 acres x 7 groups/acre = 105 groups
105 groups x 5.3 people/group = 557 people

Information Center

The capacity of a facility such as an information center is primarily a function of design. And the design is generally based on the estimate of need (demand). The U of A study report said there was a definite need expressed by visitors for more information. However, there were no statistics offered to indicate how many people might utilize an information center.

The logical place for an information center is on the rim adjacent to highway 260. In this way it would also serve visitors on their way to the White Mountains and other areas of the forest, as well as the Woods Canyon Composite.

If 50% of the 3000 weekend visitors visit the visitor center, and the average length of visit is 15 minutes, then capacity would be calculated as follows:

3000 people ÷ 5 people/party = 600 parties
600 parties × 50% participation = 300 parties
8 hr. visitation period ÷ .25 hr./party = 32 parties/parking space
300 parties ÷ 32 parties/parking space = 9 parking spaces

Add to this the expected visitation from highway travelers, assuming a 10% visitation rate, averaging 15 min./visit.

6000 vehicles × 10% participation rate = 600 parties
600 parties ÷ 32 parties/parking space = 19 spaces

Visitor Hours Generated by Facilities

The next step is to compute the visitor hours available in a day from all of the various activities. This will also be done one activity at a time.

Also, each activity should be examined to see if the optimum capacity that has been computed is realistic. For example, is the demand for the activity such that it will be used to capacity? Or are there other constraints that prohibit use up to optimum capacity?

Once again we will start with existing facilities first.

Woods Canyon Lake

A limiting factor to lake use is access and parking. Developed parking in the concession-boat ramp area is for 65 vehicles. Other parking areas total up to 40 vehicles, for a total of 105 vehicles, all on the south side of the lake. Fishermen and boaters average about 3 people per party so the capacity of the lake access parking is 315 people.

Rocky Point Picnicground and Spillway Campground are both adjacent to the lake. They have a PAOT of 225 people. Probably no more than 50% of these people are fishing at any one point in time.

$225 \text{ people} \times .50 = 113 \text{ people}$

$315 + 113 = 428 \text{ people practical capacity}$

This is considerably less than the optimum capacity of 808 people. To reach that capacity access would have to be developed on the north side of the lake.

However, one of the objectives is to maintain a range of opportunity experiences around the composite. Since the north side of the lake is about the only area of semi-primitive motorized, developing access would be contrary to this objective. Therefore, the effective capacity of the lake is 430 people.

The lake use is spread over a 12-14 hour period with probably no more than a 4 hour period at mid day reaching capacity. Assigning capacity use to an 8 hour period would be a reasonable average. In that case, the visitor hours available in a day are:

$430 \text{ people} \times 8 \text{ hours} = 3440 \text{ visitor hours}$

Nature Trail

Actual use is a good indication that the demand is far below optimum capacity. A figure of 5 groups per mile would be much more realistic than 20 groups. Therefore, the trail capacity would be:

$1 \text{ mile} \times 5 \text{ groups/mile} \times 3 \text{ people/group} = 15 \text{ people}$

Again using an 8 hour day, the visitor hours available are:

$15 \text{ people} \times 8 \text{ hours} = 120 \text{ visitor hours}$

Woods Canyon Creek

The capacity developed for this fishing activity is realistic. The distribution of use through the day is probably fairly even, therefore a 12 hour period will be used to estimate visitor hours.

$16 \text{ people} \times 12 \text{ hours} = 192 \text{ visitor hours}$

Concession Area

The concession is generally open 10 hours a day. The capacity was somewhat arbitrarily set but is our best guess.

$40 \text{ people} \times 10 \text{ hours} = 400 \text{ visitor hours}$

Rocky Point Picnicground

The design capacity is 75 people. The distribution of picnic use is probably less uniform than fishing, so a 6 hour use period will be used.

$75 \text{ people} \times 6 \text{ hours} = 450 \text{ visitor hours}$

Amphitheater

The design capacity is 100 people. The average time involved in a program is 1 hour.

$100 \text{ people} \times 1 \text{ hour} = 100 \text{ visitor hours}$

Potential Facilities

Overlooks

The capacity was developed from estimated demand so there are no changes. Visitor hours are calculated as follows:

$3000 \text{ visitors} \times 80\% \text{ participation rate} = 2400 \text{ visitors}$

$2400 \text{ visitors} \times .25 \text{ hours/visit} = 600 \text{ visitor hours}$

$600 \text{ visitor hours} \times 2 \text{ visits} = 1200 \text{ visitor hours}$

Rim Trail

In the Mogollon Rim study 36% of the people indicated that they participate in the walking activity. This would be roughly 1000 people/day at Woods Canyon. If the use period is designated at 8 hours per day and the average time per visitor is 1.30 hours, the estimated number of people participating at one time would be:

$8 \text{ hours} \div 1.3 \text{ hours/visit} = 6 \text{ visits}$

$1000 \text{ visitors} \div 6 \text{ visits} = 167 \text{ people walking at one time}$

If 75% use the rim trail, then 125 would be on the trail at one time. Therefore, the optimum capacity estimate of 207 people for walking on the trail is reasonable to use since demand for this activity is expected to increase.

The Mogollon Rim study showed that 18% of the people participated in hiking. This would involve about 540 people at Woods Canyon. If the use period is again 8 hours and the average time per participant is 1.9 hours, the estimated number of people participating at one time is:

$8 \text{ hours} \div 1.9 \text{ hours/visit} = 4 \text{ visits}$

$540 \text{ people} \div 4 \text{ visits} = 135 \text{ people hiking at one time}$

Assuming 80% of the hiking takes place on this trail, then 108 people would be on the trail at one time. Therefore the estimated optimum hiking capacity of 126 people is reasonable to use. The visitor hours generated by the Rim Trail per day for walking and hiking would be:

$333 \text{ people} \times 8 \text{ hours} = 2764 \text{ visitor hours}$

Highline Trail

The estimate of hiking demand generated in the previous section was very close to the estimated optimum capacity for the Rim trail. As discussed previously, the demand for hiking will probably increase. Therefore, accept the capacity of this trail as a feasible contribution to the composite.

118 people x 8 hours = 944 visitor hours

Picnic Area

The Mogollon Rim study showed that 74% of the people were camping, therefore 36% were day users. This is roughly 1000/day people at Woods Canyon, many of which are no doubt picnickers.

Assuming 60% wish to picnic, the estimated demand is:

1000 people x .60% = 600 people

6000 people x 1.6 hours/person = 960 visitor hours

Rocky Point picnic area can supply 450 visitor hours leaving a shortfall of 510 visitor hours.

The potential visitor hours for this new facility are: (at minimal development)

557 people x 6 hours = 3342 visitor hours

Therefore, the potential appears to be out of balance with the demand. If demand were to double over the estimate of 960 visitor hours per day, a new facility would only have to provide (1920 - 450 = 1470) visitor hours. Therefore, only an additional 1470 visitor hours will be considered as available from this activity.

Information Center

The capacity was based on an estimate of demand so there are no changes.

1500 people x .25 hours = 375 visitor hours

This doesn't include highway travel visits that are unrelated to the capacity of this composite.

Summary of Visitor Hours

The total visitor hours from non-camping developed activities in the composite are as follows:

<u>Existing</u>	
Woods Canyon Lake	3440
Nature Trail	120
Woods Canyon Creek	192
Concession Area	400

Picnic Ground	450
Amphitheater	100
Subtotal	<u>4702</u>

Potential	
Overlooks	1200
Rim Trail	2764
Highline Trail	944
Picnic Area	1470
Information Center	375
Subtotal	<u>6753</u>

TOTAL 11,455 visitor hours

It should be remembered that 36% of the use is estimated as day use. Therefore, assuming they use up 36% of the available visitor hours, the number of hours available to campers are as follows:

$11,455 - .36(11,455) = 7331$ visitor hours.

One other factor needs to be weighed. Many of the campers in the Woods Canyon Composite participate in activities outside of the composite. For most of the activities this use need not be measured because the proper participation rate is still provided in the Mogollon Rim study. For example, the "other" category no doubt includes activities both in and out of the composite.

Fishing is a different matter, however. Only the visitor hours available at Woods Canyon Lake have been tabulated so far. Willows Springs Lake is only 6 miles distant and at 3 times the size of Woods Canyon Lake, attracts many people from the Woods Canyon Composite. Some people travel to the more distant lakes as well. It is difficult to assign visitor hours to the Woods Canyon composite from these lakes, but it is probably safe to say that the available fishing visitor hours could be increased by 50% or 1,720 visitor hours.

Therefore, there are $9051(7331 + 1720)$ visitor hours available to campers.

Camper Visitor Hour Needs

The next step is to estimate the average number of hours per day that campers spend in camp or at other activities not related to recreation developments. Again, the Mogollon Rim study will be the main source of information.

The authors of this study arbitrarily defined the camping activity as no less than 8 hours and no more than 12 hours, but no averages were calculated. It is believed that more people are at the high end of the range than at the low end, however, so it will be assumed that the average time spent at the camping activity is 11 hours.

Non-camping activities that aren't tied to recreation developments, the participation rate for each activity, and the average length of time participating are listed below.

<u>Activity</u>	<u>Participation Rate</u>	<u>Average Length of Time</u>
Relaxing	73%	5.2 hours
Other	49%	3.9 hours
Driving and Sightseeing	40%	2.7 hours
Nature Study	17%	1.7 hours
Photography	9%	1.4 hours
Gathering Forest Products	9%	.6 hours

If all visitors participated in relaxing, then 5.2 hours/day could be assigned to that activity. However, since the participation rate is 73%, the hours that can actually be assigned are 73% of 5.2 or 3.8 hours. The same is true of the other activities, so the hours spent/camper/day at non-camping activities not associated with developments are calculated as follows:

<u>Activity</u>	<u>Hours</u>	<u>Participation Rate</u>	<u>Hours/Day</u>
Relaxing	5.2	.73	3.8
Other	3.9	.49	1.9
Driving & Sightseeing	2.7	.40	1.1 ^{1/}
Nature Study	1.7	.17	.3
Photography	1.4	.09	.1
Gathering Forest Products	.6	.09	.1
TOTAL			<u>7.3</u> hours

Adding 7.3 hours to the 11 hours for the camping activity gives you 18.3 hours per day for camping and non-developed activities (round to 18 hours). This leaves 6 hours per person per day that should be provided by developed site activities.

Optimum Capacity For Woods Canyon

Dividing the total visitor hours available from developed activities by 6 hours will give the optimum capacity for developed camping.

9051 available visitor hours ÷ 6 hours = 1509 visitors (campers)

1666 campers ÷ 5 campers/party = 302 parties

It appears from the above that the optimum capacity of the Woods Canyon Composite is very close to current use on summer weekends if the potential developments are added. It is recommended that this be done, in accordance with the following criteria.

1. The design capacity of camping developments should be in the vicinity of 300 units (including existing facilities).

^{1/} There is some double counting in this figure because time spent at overlooks would have been recorded as sightseeing.

2. The design capacity for picnic facilities should be in the vicinity of 65 to 75 units (including existing facilities).
3. The design capacity of overlooks should be for about 20 parking spaces with another 17 spaces being provided if one of the overlooks is located adjacent to Highway 260.
4. The design capacity for trail head development should be for 38 parking spaces.
5. The design capacity for a visitor center should be for 9 parking spaces with another 19 spaces provided if it is adjacent to Highway 260.

APPENDIX

Vicinity Map

Composite Location Map - $1/2" = 1 \text{ mile}$

Composite Map - $1" = 1 \text{ mile}$

Photos

Driver's Recreation Model

U of A Mogollon Rim Study Tables

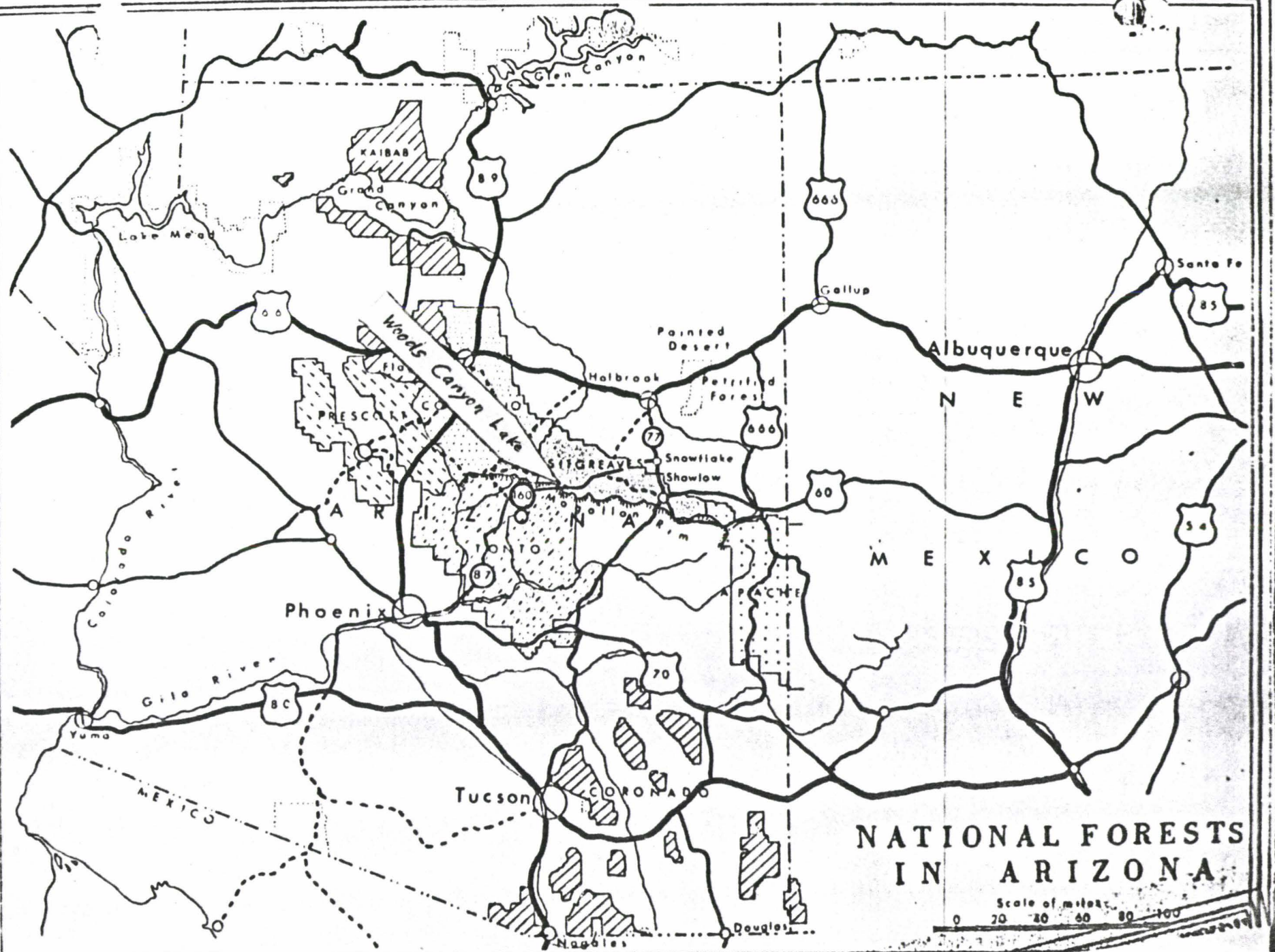
Clemson Course Handouts - Knopf

Sample of BOR Study Optimum Capacity Ranges

Letter by Chevelon District Ranger

Management Controls - Lime

Woods Canyon Use Statistics





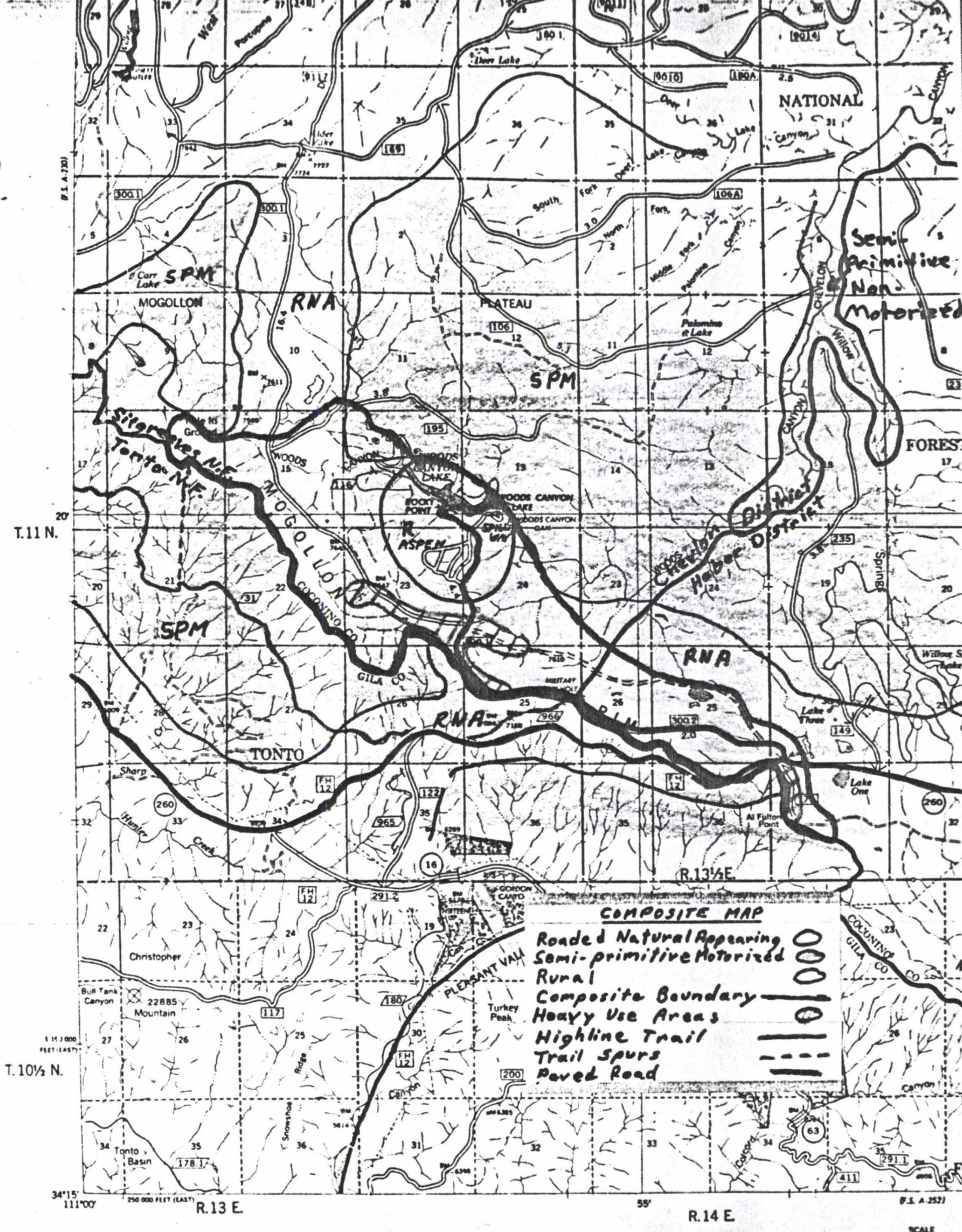
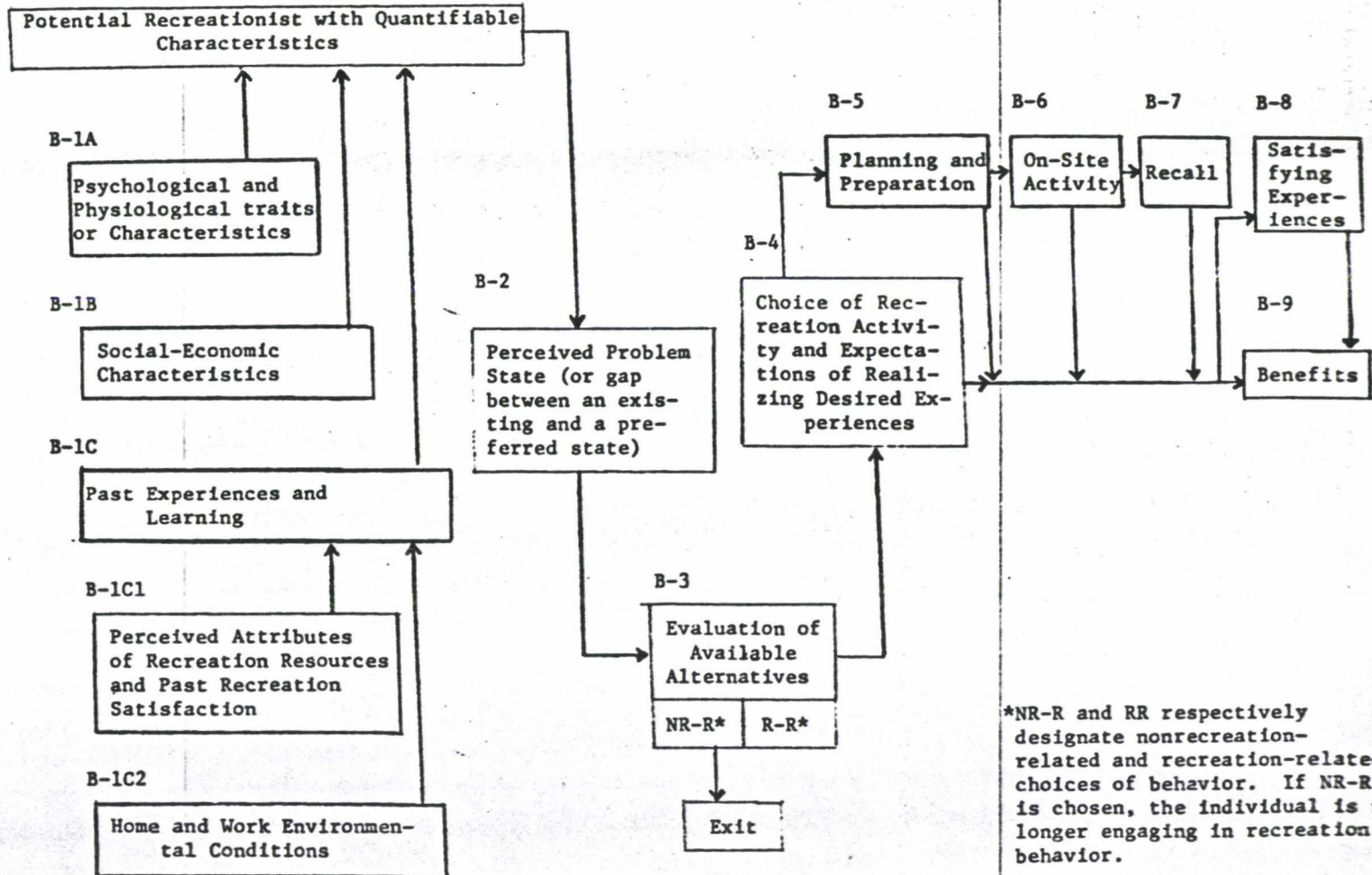


Figure 1: Quantifiable sets of variables within a sequential model of recreation behavior

B-1



*NR-R and RR respectively designate nonrecreation-related and recreation-related choices of behavior. If NR-R is chosen, the individual is no longer engaging in recreation behavior.

Driver's Recreation Model

UofA Mogollon Rim Study Tables

TABLE 4. PLACE OF RESIDENCE OF RECREATIONAL PARTIES IN THE
MOGOLLON RIM AREA, 1972

Place of Residence	Number of Parties	Percent of Total
City	410	86.7
Suburb	39	8.3
Rural Non-Farm	22	4.6
Rural Farm	2	.4
Total	473	100.0

TABLE 9. SIZE OF FAMILIES RECREATING IN THE MOGOLLON RIM AREA, 1972

Total Family Members		Number of Parties	Percent of Total
1		10	2.6
2		132	34.2
3		59	15.3
4		79	20.4
5		49	12.7
6		29	7.5
7		19	4.9
8		5	1.3
9		2	.5
10		1	.3
11		1	.3
Mean 3.6	Total	386 ^a	100.0
Median 3.8			

^aDoes not equal 384 due to computer rounding following weighting.

TABLE 10. AGE STRUCTURE OF FAMILIES RECREATING IN THE MOGOLLON RIM AREA, 1972

Number of Family Members	Under 16 years		16 Years and Over	
	Number of Parties	Percent of Total	Number of Parties	Percent of Total
0	152	39.6	---	----
1	79	20.6	18	4.7
2	69	18.0	290	75.5
3	47	12.2	47	12.2
4	23	6.1	24	6.3
5	10	2.6	4	1.0
6	1	.3	0	----
7	0	----	0	----
8	1	.3	1	.3
9	1	.3	0	----
Total	383 ^a	100.0	384	100.0

Mean, under 16: 1.4

Mean, 16-and over: 2.3

^aDoes not equal 384 due to computer rounding following weighting.

TABLE 11. AGE OF LEADERS OF RECREATIONAL PARTIES VISITING
THE MOGOLLON RIM AREA, 1972

Age in Years	Number of Parties	Percent of Total
24 and less	65	13.6
25 - 29	75	15.7
30 - 34	74	15.5
35 - 39	51	10.7
40 - 44	39	8.2
45 - 49	52	10.9
50 - 54	35	7.3
55 - 59	41	8.6
60 - 64	26	5.5
65 and over	19	4.0
Mean 39.2	Total 477 ^a	100.0

^aDoes not equal 473 due to computer rounding following weighting.

TABLE 22. YEARS OF CAMPING EXPERIENCE AND YEARS OF EXPERIENCE VISITING THE MOGOLLON RIM AREA BY RECREATIONAL PARTY LEADERS, 1972

Years	Camping Experience		MRA Visiting Experience	
	Number of Parties	Percent of Total	Number of Parties	Percent of Total
0	145	30.6	58	12.3
1	7	1.4	15	3.2
2	5	1.1	26	5.4
3	8	1.8	34	7.2
4	8	1.6	23	4.8
5	11	2.4	21	4.4
6 - 10	48	10.2	109	23.1
11 - 15	53	11.2	61	12.9
16 - 20	63	13.4	63	13.3
21 - 25	33	6.9	31	6.5
26 and more	92	19.4	33	6.9
Mean ^{a,b}	Total	473	474 ^c	100.0

^aMeans, camping experience: 0-25 = 8.1 years; 0-80 = 14.5 years.

^bMeans, visiting experience: 0-25 = 8.8 years; 0-80 = 11.9 years.

^cDoes not equal 473 due to computer rounding following weighting.

TABLE 23. NUMBER OF TRIPS PER YEAR MADE TO MOGOLLON RIM AREA BY RECREATIONAL PARTIES, 1972

Trips per Year	Number of Parties	Percent of Total
0	75	15.9
1	59	12.5
2	65	13.8
3	39	8.3
4	46	9.7
5	31	6.6
6	24	5.1
7	9	1.9
8	20	4.2
9	2	.4
10 - 14	55	11.6
15 - 19	8	1.7
20 - 24	16	3.4
25 or more	23	4.9
Mean 5.9	Total 472 ^a	100.0

^aDoes not equal 473 due to computer rounding following weighting.

TABLE 24. LENGTH OF STAY OF RECREATIONAL PARTIES VISITING THE
MOGOLLON RIM AREA, 1972

Number of Days	Number of Parties	Percent of Total
1	153	32.4
2	174	36.8
3	85	18.0
4 - 7	50	10.6
8 - 14	9	1.8
15 - 28	0	.3
29 - 63	0	.1
Mean 2.4	Total 471 ^a	100.0
Median 2.5		

^aDoes not equal 473 due to computer rounding following weighting.

TABLE 27. NUMBER OF PARTIES BY HOURS OF PARTICIPATION IN OUTDOOR RECREATIONAL ACTIVITIES IN THE MOGOLLON RIM AREA, 1972 n=313

Activity	Hours of Participation ^a						Total Percent of Parties Sample ^b	
	.1 - 1.0	1.1 - 2.0	2.1 - 4.0	4.1 - 7.5	7.6 - 8.0	8.1 and More		
Relaxing	8	27	56	49	37	50	227	72.5
Other	21	26	40	40	4	22	153	48.9
Driving	18	36	52	14	6	1	127	40.6
Fishing	8	23	45	32	9	4	121	38.7
Walking	58	38	13	4	0	--	113	36.1
Picnicking	22	36	13	3	--	--	74	23.6
Hiking	15	22	18	3	--	--	58	18.5
Nature Study	24	16	4	3	--	2	49	15.7
Photography	20	7	1	--	--	2	30	9.6
Forest Products	23	4	0	0	--	--	27	8.6
Boating	5	3	10	7	1	--	26	8.3
Swimming	7	5	8	--	--	1	21	6.7
ORV	1	6	4	1	1	1	14	4.5
Games	--	3	3	0	--	1	7	2.2
Bicycling	1	3	--	--	--	--	4	1.3
Horseback Riding	2	1	--	0	--	1	4	1.3
Talks & Programs	--	1	--	--	--	--	2	.6

^aDoes not equal sample totals due to computer rounding following weighting.

^bWill not equal 100% due to multiple responses.

This table used to estimate ave. hours of participation per person

TABLE 29. PREFERENCE RANKS BY MOGOLLON RIM VISITORS OF ALTERNATIVE RECREATIONAL AREAS IN ARIZONA, 1972
n=473

Areas	Ranks											
	1st		2nd		3rd		4th		5th		No Preference	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
	of	of	of	of	of	of	of	of	of	of	of	of
	Parties	Sample	Parties	Sample	Parties	Sample	Parties	Sample	Parties	Sample	Parties	Sample
Mogollon Rim	192	40.6	167	35.3	57	12.1	16	3.4	10	2.1	30	6.3
Prescott National Forest	15	3.2	41	8.7	95	20.1	109	23.0	81	17.1	132	27.9
Jak Creek Canyon	52	11.0	97	20.5	104	22.0	63	13.3	54	11.4	103	21.8
San Francisco Peaks	11	2.3	21	4.4	52	11.0	98	20.7	127	26.8	165	34.9
White Mountains	183	38.7	98	20.7	72	15.2	12	2.5	17	3.6	91	19.2
Total ^a	453		424		380		298		289			

^aDoes not equal 473 nor 100% because respondents did not rank all areas.

TABLE 30. REASONS WHY RESPONDENTS PREFERRED THEIR FAVORITE OUTDOOR RECREATION AREA, 1972 n=473

Reason	Recreational Areas										Reason Total ^a	
	Mogollon Rim Area		White Mountains		Prescott Nat. For.		Oak Creek Canyon		San Francisco Peaks		Number of Parties	Percent of Sample
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent		
	of Parties	of Sample	of Parties	of Sample	of Parties	of Sample	of Parties	of Sample	of Parties	of Sample		
Physical												
Attractiveness	124	28.6	85	30.5	6	26.1	34	52.3	4	36.4	253	53.5
Proximity	98	22.6	9	3.2	6	26.1	6	9.2	5	45.4	124	26.2
Crowds-Remoteness	56	12.9	39	14.0	4	17.4	2	3.1	0	----	101	21.4
Facilities-Management	46	10.6	25	9.0	4	17.4	4	6.1	0	----	79	16.7
Familiarity	45	10.4	14	5.0	0	----	5	7.7	2	18.2	66	14.0
Hunting-Fishing	33	7.6	71	25.4	1	4.3	2	3.1	0	----	107	22.6
Water	21	4.8	32	11.5	0	----	10	15.4	0	----	63	13.3
Roads	11	2.5	4	1.4	2	8.7	2	3.1	0	----	19	4.0
No Preference											23	4.9
Area Total	434	100.0	279	100.0	23	100.0	65	100.0	11	100.0		

^aDoes not equal 473 nor 100% due to multiple responses.

TABLE 34. CATEGORIZED GENERAL REMARKS OF VISITORS TO THE MOGOLLON RIM AREA, 1972

Category	Factor	Number of Responses	Total
Development			250
	For development	87	
	Against development	163	
Roads			97
	More or better roads	21	
	No more roads	76	
Site Location			229
	Adjacent to lake or stream	18	
	Separate swimming, boating, fishing, and ORV sites	11	
Facilities			135
	General		
	Okay as is	19	
	Need more and better	37	
	Units too close together	11	
	Units too far apart	5	
	More drinking water	33	
	More and better refuse cans and restrooms	30	
Information			118
	Improved Visitor Information Service	89	
	Improved road and trail signs	29	
Law Enforcement			50
	Enforce site and area regulations	21	
	Object to ORV use in developed sites	29	
Crowding			68
	Sites too crowded	68	
Fees			67
	Agreeable to fees	39	
	Object to fees	28	
Fishing and Hunting			40
	Fishing should be improved	31	
	Hunting should be improved	9	
U.S.F.S. Management Rating			86
	Approves of site management	36	
	Likes area in general	50	

TABLE 1. The importance of selected reasons for using campgrounds in the northeastern Lower Peninsula of Michigan for a sample of 100 campers, stratified by the nature of their home environments.

Home Environment (Size of Sample)	Preference State			Escape Visually Unpreferred Physical Environment
	Escape Physical Stressors	Seek Security in Social Environment	Seek Privacy	
	----- Mean Score ^a -----			
Central area of large city of more than 500,000 people (8)	4.9	4.2	3.7	4.8
Central area of medium city of 100,000-500,000 people (10)	3.5	3.2	2.3	4.3
Suburb of medium or large city (23)	3.4	3.2	2.3	3.8
Small city of 50,000- 100,000 people (13)	3.4	3.3	2.3	4.2
Town of 5,000-50,000 people (15)	3.1	3.3	2.0	4.4
Rural area or village of less than 5,000 people (31)	2.4	2.4	1.9	3.6

^aKnopf (1973). Possible scores range from 1 to 6, where a 1 represents "Not Important" and a 6 represents "Extremely Important."

SOURCE: R.C. Knopf. 1976. Relationships between desired consequences of recreation engagements and conditions in home neighborhood environments. Doctoral dissertation, The University of Michigan, p. 22.

TABLE 2. Mean scores of five types of Michigan recreationists to selected stress-related preference scales by perceived quality of home neighborhood and work environments.^a

Perceived Neighborhood and Work Environment Scale	N	Recreation-related Preference Scale Mean Score ^b		
		Physical Stress	Autonomy	Security
Physical Quality of Neighborhood				
1. (High)	88	2.5	2.4	2.6
2.	104	2.8	2.8	2.8
3.	65	3.1	2.9	3.0
4. (Low)	26	4.1	3.3	3.2
Social Quality of Neighborhood				
		<u>Physical Stress</u>	<u>Autonomy</u>	<u>Action</u>
1. (High)	88	2.5	2.5	1.6
2.	111	2.8	2.7	2.1
3.	60	3.2	3.0	2.0
4. (Low)	23	3.8	3.2	2.3
Job is Demanding				
		<u>Slow Down Mentally</u>	<u>General Pressures</u>	<u>Release Tension</u>
1. Seldom	50	3.2	2.7	2.3
2.	100	3.6	3.0	2.5
3.	78	4.0	3.3	2.9
4. Usually	28	4.4	3.8	3.7
Job is Routine				
		<u>Change</u>	<u>Autonomy</u>	<u>Physical Stress</u>
1. Seldom	46	4.4	2.5	2.7
2.	77	4.5	2.5	2.7
3.	89	4.7	2.9	3.0
4. Usually	49	5.0	3.1	3.5

^a Recreationists studied (with number of usable responses or N in parentheses) were coho salmon fishermen (40), youth organization canoers of Au Sable River (50), picnickers in state park (45), and two types of campers, one group of which were 40 campers in a modern developed campground in a state park about 40 miles from Detroit and another group of 99 campers using rustic state parks in northern part of Michigan's Lower Peninsular (Driver and Knopf 1976b).

^b Possible scores range from 1 to 6, where a 1 represents "Not Important" and a 6 represents "Extremely Important."

SOURCE: R.C. Knopf. 1976. Relationships between desired consequences of recreation engagements and conditions in home neighborhood environments. Doctoral dissertation, The University of Michigan, p. 23.

Table 4.--Percentage distribution of participation in selected outdoor recreation activities in the contiguous States, summer 1972 and fall and winter 1965, by age class

Activity	Age class				
	12-17	18-24	25-44	45-64	65 & over
Attending outdoor concerts, dramas, etc.	7.6	12.9	4.7	6.0	2.5
Attending outdoor sports events	18.1	15.1	12.3	8.6	5.3
Bicycling	31.9	12.6	7.8	3.9	1.6
Birdwatching	3.7	2.8	4.7	4.6	2.1
Boating (other than sailing and canoeing)	19.6	16.7	17.7	11.5	3.6
Camping in developed campground	19.2	12.9	13.2	7.1	2.4
Camping in remote or wilderness area	8.2	6.9	6.3	2.4	0.3
Canoeing	4.4	4.9	3.5	1.2	.6
Driving for pleasure	30.0	44.4	36.1	32.2	26.0
Driving 4-wheel vehicle off road	3.4	2.3	2.3	.6	.2
Fishing	31.3	26.7	28.9	18.3	10.5
Golf	4.3	5.8	4.8	6.2	1.2
Hiking with pack/mountain/rock climbing	12.7	8.4	5.2	2.1	.3
Horseback riding	15.4	9.8	3.8	1.4	.2
Hunting 1/	15.0	18.0	14.0	9.0	4.0
Nature walks to observe birds, plants etc.	23.7	22.5	18.9	12.5	5.0
Picnicking	49.3	53.5	55.1	41.2	24.8
Playing other outdoor sports (not golf and tennis)	47.4	30.2	24.9	8.6	2.6
Riding motorcycles off the road	10.4	8.9	4.5	1.0	.3
Sailing	4.2	3.9	2.2	2.0	.7
Sightseeing	38.9	38.3	40.2	38.5	25.6
Swimming--outdoor pool	38.6	23.1	18.2	9.7	2.6
Swimming--other outdoor	56.7	47.0	41.8	17.5	4.4
Tennis	11.7	10.6	4.5	1.6	.5
Visiting zoos, fairs, amusement parks	33.2	29.0	29.4	17.0	8.2
Walking for pleasure	49.5	41.7	34.1	27.8	19.0
Water skiing	8.1	10.8	6.8	1.0	0.0
Wildlife and bird photography	2.5	2.7	2.3	1.6	.6
Ice skating 1/	29.0	18.0	7.0	2.0	----
Snow skiing 1/	10.0	8.0	3.0	1.0	----
Sledding 1/	40.0	20.0	13.0	2.0	----
Other activities	30.1	29.2	24.1	21.3	17.4

1/ 1965 data.

Sources: U. S. Department of the Interior, Bureau of Outdoor Recreation. The 1965 survey of outdoor recreation activities. Government Printing Office, Washington, D. C. 101 p. 1967, and Outdoor recreation: a legacy for America--Appendix "A": an economic analysis, op. cit.

TABLE 15. Effects of residential crime rate upon reasons for engaging in most frequent activities: Experience Secure Environment.

<u>Test Group</u>	<u>Average Annual Burglary Frequency for Home Neighborhood^a</u>	<u>Mean Score^b</u>	<u>Standard Deviation</u>	<u>N</u>
1	< 6	2.3	1.1	13
2	6-10	2.8	1.1	79
3	11-15	3.1	1.3	54
4	> 15	3.5	1.3	16

Analysis of Variance

<u>Source</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>Significance Level</u>	<u>Est w^2^c</u>
Crime rate	3	4.21	2.83	.05	.033
Error	158	1.49			

^aFor a given neighborhood, the burglary frequency is equal to the number of reported break-ins for the half-mile square locale in which it lies (see Table 6, Chapter II).

^bScore range: 1-6. Responses were coded 1 for "Not Important" through 6 for "Extremely Important" (Q3, Appendix B).

^c w^2 is an index of the strength of association between the independent and dependent variables (Hays 1963: 407).

SOURCE: R.C. Knopf. 1976. Relationships between desired consequences of recreation engagements and conditions in home neighborhood environments. Doctoral dissertation, The University of Michigan, p. 58.

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
Chevelon Ranger District
1520 West Third Street
Winslow, Arizona 86047

Done 7/12/77

REPLY TO: 2330 Developed Sites

7 July 1977

SUBJECT: Use at Woods Canyon Lake Recreational Complex



TO: Forest Supervisor

Attached is some information on the number of people counted at the road block going into Woods Canyon.

No one on the District had any idea we had this kind of traffic into the Woods Canyon area.

Some things to keep in mind when reviewing these figures are:

1. These people could only go to Woods Canyon. The other roads were closed.
2. The campground was full during this time, so the people could only go in for day use.
3. It had been on radio, TV and in the papers that the Sitgreaves National Forest was closed except for the campgrounds.

I'm sure this is not a true picture of what the use would have been if the Forest had not been closed. But it is an eye-opener.

W. Quinten Cole

W. QUINTEN COLE
District Ranger

cc - R+L
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jcy

Copies Rec'd		Copies to RD's		C. for	
APACHE-SITGREAVES N.F.					
Supervisor	1	1	1	1	1
Deputy	1	1	1	1	1
R & L	1	1	1	1	1
Timber	1	1	1	1	1
Range	1	1	1	1	1
Fire	1	1	1	1	1
Engineer	1	1	1	1	1
A.G.	1	1	1	1	1
L.U.P.	1	1	1	1	1

JUL 08 77

UNITED STATES FOREST SERVICE
Chevelon Ranger District
1520 West Third Street
Winslow, Arizona 85047

REPLY TO: 2330 Developed Sites

7 July 1977

SUBJECT: Use at Woods Canyon Lake Recreational Complex

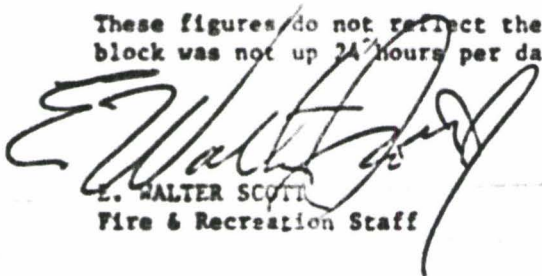


TO: District Ranger

I have compiled some very accurate use figures for the Woods Canyon Lake area since we had our Road Block set-up at the junction of the 300 Rd. and State Highway 260. These use figures are numbers of people that went to Woods Canyon Lake Recreational Area. The following were the figures compiled:

<u>Date</u>	<u>Number of People</u>	<u>Times That Road Block Was Set Up</u>
6/21	418	1300-1900
6/22	307	1300-1900
6/23	329	1300-1800
6/24	1,248	0800-2400
6/25	1,350	0800-2200
6/26	1,525	0800-1700
6/27	381	0900-1700
6/28	410	0900-1600
6/29	456	0900-1600
6/30	650	0900-1600
7/1	1,100	0900-2400
7/2	1,500	0900-2400
7/3	2,053	0900-2400
13 days	11,727	

These figures do not reflect the absolute total because the road block was not up 24 hours per day.


L. WALTER SCOTT
Fire & Recreation Staff

Management Controls

Table 1.—Some measures to control the character and intensity of recreational use to meet desired management objectives.

Type of control	Method	Specific control techniques
Site Management (Emphasis on site design, landscaping, and engineering)	Harden site	Install durable surfaces (native, nonnative, synthetic) Irrigate Fertilize Revegetate Convert to more hardy species Thin ground cover and overstory
	Channel use	Erect barriers (rocks, logs, posts, fences, guardrails) Construct paths, roads, trails, walkways, bridges, etc. Landscape (vegetation patterns)
	Develop facilities	Provide access to underused and/or unused areas Provide sanitation facilities Provide overnight accommodations Provide concessionaire facilities Provide activity-oriented facilities (camping, picnicking, boating, docks, other platforms, playground equipment, etc.) Provide interpretive facilities
Direct Regulation of Use (Emphasis on regulation of behavior; individual choice restricted; high degree of control)	Increase policy enforcement	Impose fines Increase surveillance of area
	Zone use	Zone incompatible uses spatially (Hiker only zones, prohibit motor use, etc.) Zone uses over time Limit camping in some campsites to one night, or some other limit.
	Restrict use intensity	Rotate use (open or close roads, access points, trails, campsites, etc.) Require reservations Assign campsites and/or travel routes to each camper group in backcountry Limit usage via access point Limit size of groups, number of horses, vehicles, etc. Limit camping to designated campsites only Limit length of stay in area (max./min.)
Indirect Regulation of Use (Emphasis on influencing or modifying behavior; individual retains freedom to choose; control less complete, more variation in use possible)	Restrict activities	Restrict building campfires Restrict fishing or hunting
	Alter physical facilities	Improve (or not) access roads, trails Improve (or not) campsites and other concentrated use areas Improve (or not) fish or wildlife populations (stock, allow to die out, etc.)
	Inform users	Advertise specific attributes of the area Identify the range of recreation opportunities in surrounding area Educate users to basic concepts of ecology Advertise underused areas and general patterns of use
	Set eligibility requirements	Charge constant entrance fee Charge differential fees by trail, zone, season, etc. Require proof of ecological knowledge and recreational activity skills